A Global Vegetation Modeling System for NEWS

A Step-1 Proposal submitted to the National Aeronautics and Space Administration

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This is a Discovery-Driven NEWS Investigation that includes the NEWS strategic elements:

Observation, Understanding, Models, and Prediction

Abstract

We propose to develop, parameterize, and evaluate a global modeling system for simulating land-atmosphere exchanges of water, energy, and carbon that will be applied in both a prognostic climate model (Community Climate System Model, CCSM) and in a global operational diagnostic (data assimilation) model (Land Information System, LIS). The model will be based on improvements to the Community Land Model (CLM3) with extensions for prognostic phenology, ecosystem competition, subgrid-scale water redistribution, physiological stress, and canopy air space energy budget. The model will be parameterized using satellite products documenting fractional land coverage by plant functional types and the fraction of photosynthetically active radiation absorbed by plant canopies (FPAR). Model evaluation at multiple spatial scales will be performed using local measurements of micrometeorological fluxes and storage of water and carbon, stream discharge from instrumented catchments, and regional information about snow cover and water storage. The modeling system and related data sets will be delivered to both the CCSM and LIS groups through structured collaborations (see attached letters).